DIGITAL REFRACTOMETER

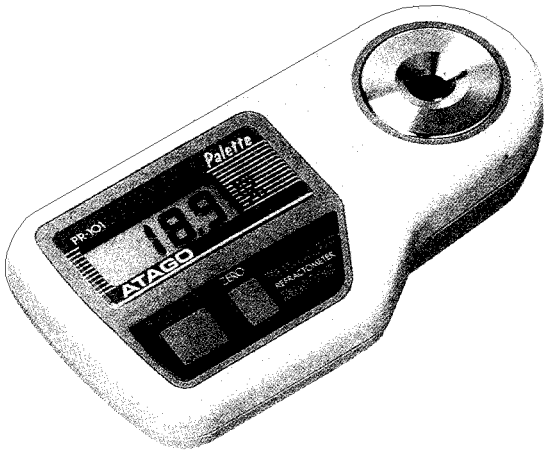
Palette Series

- PR-101 Cat.No.3412
- PR-201 Cat.No.3422
- PR-301 Cat.No.3432

ATAGO

3412-E03

INSTRUCTION MANUAL



When a malfunction is suspected!

Malfunctions often come from low battery. Check the battery first, and if the battery is low, replace it with a new battery.

CONTENTS

What are the characteristics of your sample?

The method of measurement to be employed may be different from ordinary method for samples with the following characteristics. Please read pages indicated below so that you can make measurement correctly.

1. Precautions on use
(Be sure to read the following before use)

Preface

Thank you for your purchase of ATAGO's Digital Refractometer Palette Series. For correct operation of the Palette and accurate measurement with it, carefully read the following instructions before using the Series and keep this manual at hand for future reference.
Among the contents of this manual, "Precautions for Safety" requires most careful reading because there are many important matters for safety appearing in that paragraph.

Precautions for Safety—Make sure to follow the instructions mentioned below.

To take precautions against possible accidents such as harming and damaging persons and properties, this manual contains important instructions with warning and caution markings. The warning and caution marks appearing in this manual express the following meanings. We hope you understand those marks well and read such important instructions very carefully for safe use of this refractometer.

Meanings of marks and words

⚠ **Warning**	Instructions with this mark and word are very important for safety. If user incorrectly handles and operates the refractometer ignoring the instructions with this mark and word, it may result in decease or serious injury of the user.
⚠ **Caution**	Instructions with this mark and word are very important for safety. If user incorrectly handles and operates the refractometer ignoring the instructions with this mark and word, it may result in injury of the user and physical damage to the refractometer and other matters.

Meanings of symbolic marks

⚠	This mark expresses warning (cautionary) matters. Warning in detail appears nearby or in this mark.
⊘	This mark expresses forbidden actions. Forbidden action in detail appears nearby or in this mark.
❗	This mark expresses must-do actions. Must-do action in detail appears nearby or in this mark.

For handling this refractometer

Warning

- When using this instrument for measuring matters harmful to humans, very carefully do it with gloves and a proper mask as well as with a good knowledge of the characters of the matters.

- If the refractometer is dropped or shocked strongly, immediately ask to inspect it.
  If the refractometer is continuously operated in such a condition, it may cause smoking, burning or fire.

- Don't disassemble, repair, modify the refractometer by yourself because there is fear to get electric shock or burnt.

Caution

- Don't wet the refractometer except the prism surface with water or sample liquid unreasonably. If the refractometer gets wet excessively, it may cause malfunction and breakdown of the refractometer.

- Don't tap or pick at the prism surface with a metal spoon, tweezers, etc. because the prism surface is made of optical glass.
  If the prism surface is scratched, the refractometer may fail in measurement.

For handling this refractometer (continued)

Caution

●When measurement is complete, wipe up sample from the prism surface and its surroundings with soft tissues moistened with water first, and then wipe the wet parts with dry tissues to dry them up.

●After measurement of a sample of a high molecular compound, oil and fat, etc., wipe the prism surface with tissues moistened with alcohol or neutral detergent first and then wipe it up again with dry tissues to dry up.

●When transporting the refractometer, make sure to put it in the carton case which the refractometer was initially contained in.

●First of all, carefully read this instruction manual to know the function and operating method of each part of the refractometer.
●Before using this refractometer, check to see if each part normally operates or not.
●Before starting measurement, make sure to perform check and adjustment work such as calibration(zero setting), etc. according to the instructions.
●If the refractometer is used for purposes other than the original uses (for measurement of sugar content [Brix %], concentration of solution), ATAGO won't liable for any breakdown or damage resulting from such the use.
●Keep it in mind that the prism to contact with samples falls under the expendable supplies and it will be charged for replacement.
●ATAGO won't be liable for any loss and damage of the material that is sampled for measurement with this instrument at all.

Handling of battery

Warning

●Make sure to use a specified battery or that supplied with the refractometer as an accesory. When loading the refractometer with a battery, pay heed to the polarities of the battery.
If a battery out of the specification is used, it may cause smoke or fire because some batteries are different in the voltage and polarities.

Caution

●Don't heat, shortcircuit, burn a battery or take it apart. If done so, it may cause burst or fire.

●When keeping or disposing a battery, protect both poles with insulating tape, etc.
If a battery is kept or disposed as the poles are not covered, it may cause shortcircuit, burst or fire.

Environmental conditions

- Use this refractometer in a place where it is lower than 2,000m above sea level.
- Use the PR-101 at an ambient temperature of 5℃ to 40℃.
- Use the PR-201 and PR-301 at an ambient temperature of 10℃ to 40℃.
- Use this refractometer at a humidity lower than 90%.
- Don't put this refractometer at a place where it is directly exposed to the sunlight or the temperature is extremely high (higher than 40℃), in a closed car, near the heating equipment, etc.
- Avoid sudden change of the ambient temperature.
- Don't put the refractometer in a place where it is strongly shocked.
- Don't use the refractometer in a dusty place.
- Don't put the refractometer in a place where the temperature extremely goes down.
- Don't put the refractometer in a extremely humid place.
- Don't put a heavy thing on the refractometer or don't drop anything onto the refractometer.

In regard of handling the refractometer

- Avoid neither dropping the refractometer nor getting it shocked strongly.

Daily maintenance

- When the refractometer is soiled, clean it with soft cloth.
- Don't use benzine, thinner, etc, for cleaning.

2. Comfirmation of package

Please confirm the following contents of the package immediately when the Unit is unpacked

- Refractometer ····· 1
- Battery ····· 1
- Screwdriver (plate type) ····· 1
- Instruction Manual (Japanese & English version) ····· 1
- Inspection Card ····· 1
- Sample Holder (PR-201·PR-301) ····· 1
- Standard Liquid (PR-301) ····· 1
- Round Sheet (a set of 50 sheets)(PR-301) ····· 1

3. Name and roles of each part

(1) Liquid Crystal Display (LCD)

Measured values (Brix%) are displayed on the Liquid Crystal Display

(2) Sample Stage

A prism on which sample is dripped is existing at the center of the Sample Stage. The stage is made of stainless steel.

(3) Zero Setting Switch (Standardization Switch)

Press the Zero Setting Switch at zero setting of the Unit.

(4) START/OFF Switch

Press this switch to start measurement. Note that the measured value goes off if this switch is kept pressed for over 2 seconds.

(5) Battery Cover

Remove this cover to set or replace the battery (006P).

Fig.1

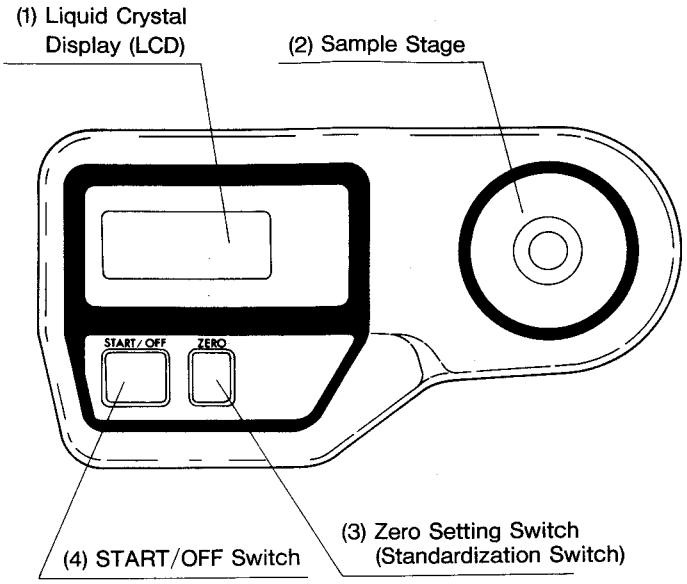
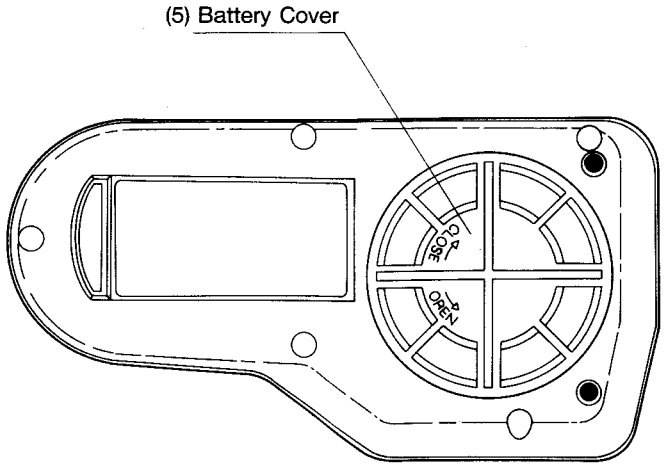

(1) Liquid Crystal Display (LCD)
(2) Sample Stage
START/OFF
ZERO
(4) START/OFF Switch
(3) Zero Setting Switch (Standardization Switch)

Fig.2


(5) Battery Cover
CLOSE
OPEN

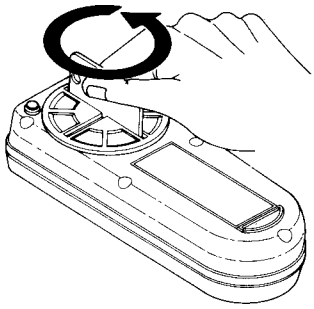
4. Insertion of battery

⚠ CAUTION

- When loading the refractometer with a new battery, carefully do it not to make a mistake in connection of the positive(+) and negative(−) poles of the battery if they are wrongly connected, it causes a trouble or damage of the refractometer.
- When closing the battery cover after battery replacement, make sure not to turn it with the screw driver supplied together with the refractometer but to do it with fingers. If the screw driver is used to closing the battery cover is closed too tightly and it is hard to open it again.

(1) Turn left the Battery Cover by the driver of accessories as illustrated for opening. (Fig.3)

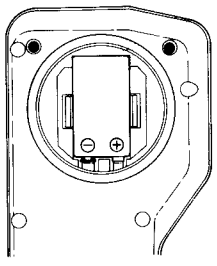
Fig.3



(2) Insert a battery correctly as to its polarity. (Fig.4)

Note:
Since the battery supplied as an accessory is just for operation test of the refractometer and will be dead in a comparatively short time of operation, prepare a new battery for replacement early.

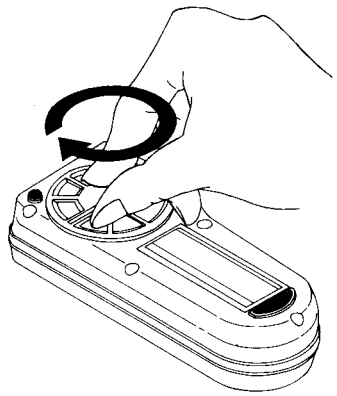
Fig.4



(3) Insert a battery correctly as to its polarity.
Turn right the Battery Cover by your bare hands for closeing. (Fig.5)

Note:
Close the battery cover by your bare hands without using the attached driver (One of accessories), otherwise the battery cover may be too tight to open.

Fig.5



- Electronic circuits of the Unit turn on as soon as the battery is set. Thus, there is no power switch on this Unit.
- When the voltage of the battery is low after some time, purchase a new 006P battery and change the old battery with new one. Be sure to carry out zero setting when the battery is changed.
- It is recommended to use a 006P-size alkaline battery which is available on the market, because its service life is twice as long as that of an ordinary battery.
- Keep the battery removed from the Unit when the Unit is not to be used for a month or so. If the battery is kept inside, it will be exhausted in about 3 months even for a new battery.

5. Zero setting(In case of PR-101, PR-201)

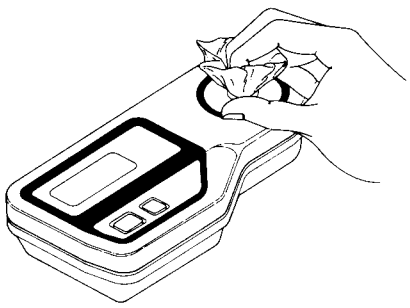
⚠CAUTION

- ●The refractometer needs the "zero−setting"(calibration) before it is used for the first time in a day. Moreover, if the ambient temperature changes during the daily work with the refractometer, it needs the zero−setting again.
- ●The zero−setting is also needed whenever the battery is replaced.
- ●Don't use any metallic implement for dropping water on the prism, because there is a fear that metal goods possibly damage the prism surface.

(1) Prepare distilled water or tap water.

(2) Clean the Prism Surface. (Fig.6)

Fig.6



(3) Drip a few drops of water on the prism. At this time, make sure that water covers the prism surface completely. (Fig.7・Fig.8)

Fig.7

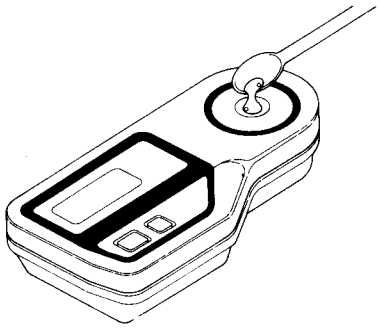
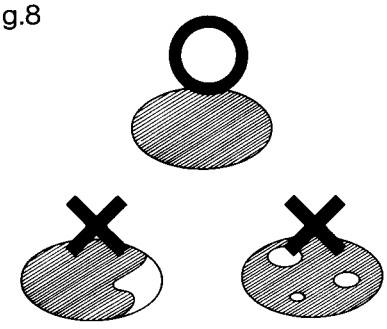
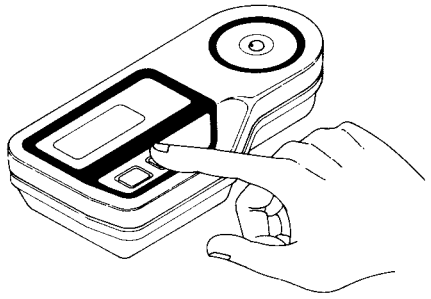


Fig.8



(4) Press the Zero Setting Switch with finger tip. (Fig.9)

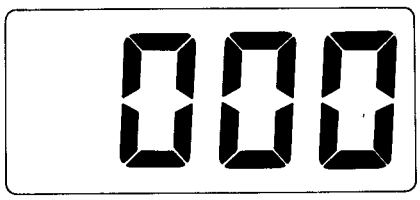
Fig.9



(5) "000" blinks two times on the LCD and then it is displayed continuously. (Fig.10)

*If the LCD displays a number other than "000", repeat this Zero Setting procedure from the beginning again.

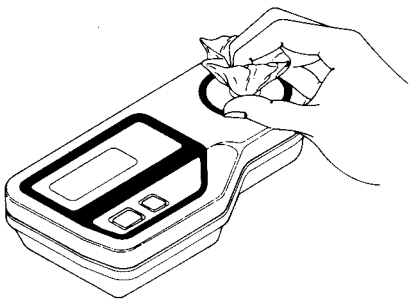
Fig.10



(6) The Zero Setting is now over. Wipe off the water on the Prism Surface completely with tissue paper. (Fig.11)

*Use tissue paper of which fibers do not come off. The use of Kim Wipe S-200 (by Jujo-Kimberly) is recommended.

Fig.11



●The zero setting state of the Unit is maintained until the battery is exhausted or replaced.
●Carry out the Zero Setting when the battery is replaced.

6. Standardization(In case of PR-301)

⚠CAUTION

- When the refractometer is used for the first time after purchase or the battery is replaced, make sure to perform the "zero－setting" (standardization) for the refractometer.
- Don't use any metallic implement for putting a round sheet or the like on the prism, because there is a fear that metal goods possibly damage the prism surface.

(1) Prepare the Standard liquid "LG" supplied as an accessory.

(2) Clean the Prism Surface, (Fig.12)

(3) Place a round sheet included as an accessory on the Prism with tweezers (Fig.13)
Drip a few drops of standard Liquid on the round sheet to wet the round sheet (Never drip excesively).(Fig.14)

Fig.12

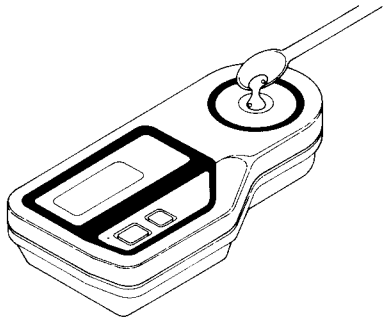


Fig.13

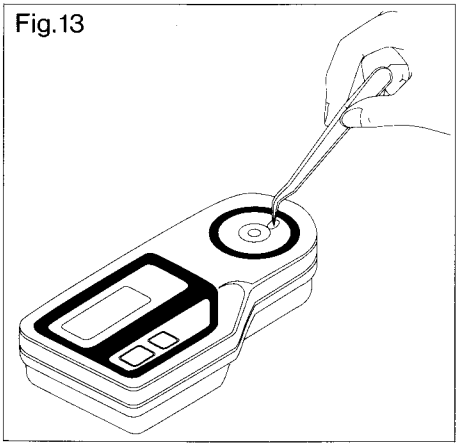
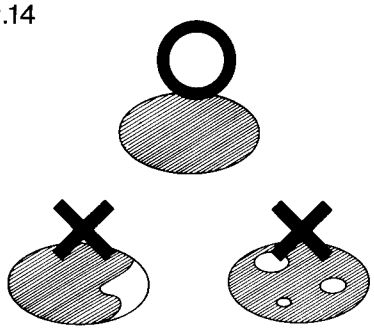
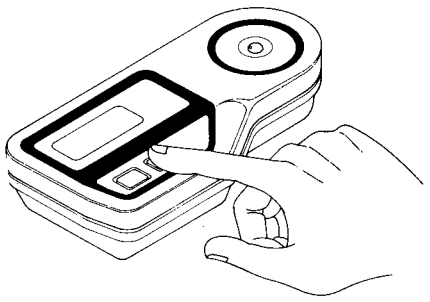


Fig.14



(4) Press the Standardization Switch with finger tip.(Fig.15)

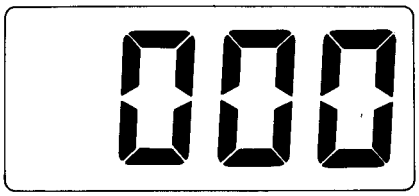
Fig.15



(5) "000" blinks two times on the LCD and then it is displayed continuously.(Fig.16)

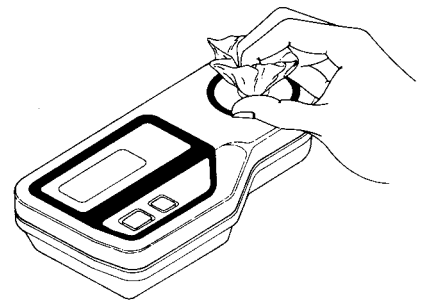
* If the LCD displays a number other than "000", repeat this standardization procedure from the beginning again.

Fig.16



(6) The Standardization is now over. Remove the round sheet from the Prism Surface, wipe off the Standard Liquid remaining on the Prism Surface completely with tissue paper, and then clean the Prism Surface with tissue paper moistened with alcohol. (Fig.17)

Fig.17



- The standardized state on the Unit is maintained until the battery is exhausted or replaced.
- Carry out the Standardization only when the battery is replaced. Do not carry out Standardization before each measurement or daily.

7. Mesurement on sample

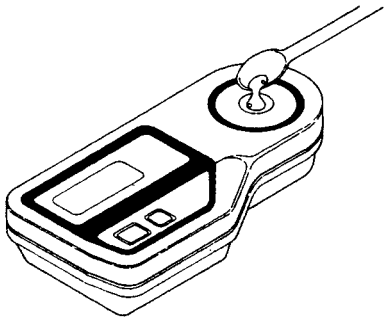
⚠CAUTION

●When using this instrument for measuring solution containing substances harmful to humans, make sure to do it most carefully with gloves and a proper mask as well as with a good knowledge of the substances and the solution.

●Don't use any metallic implement for sampling, because there is a fear that metal goods possibly damage the prism surface.

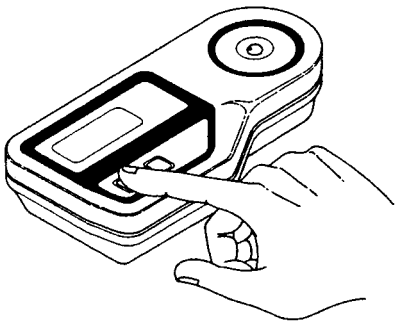
(1) Wipe and clean the Prism Surface, and drip sample on the prism.(Fig.18)

Fig.18



(2) Press the START/OFF Switch. (Fig.19)

Fig.19



(3) An arrow blinks two times on the LCD, and then Brix% (concentration of sugar solution) of the sample is displayed on the LCD. (Fig.20)

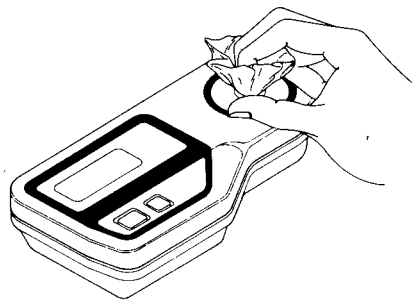
(4) The value displayed on the LCD is maintained for about 5 minutes.
To turn off the display, keep the START/OFF Switch pressed for about 2 seconds.

(5) Wipe off the sample, and wipe and clean the Prism and the Prism Stage with tissue paper moistened with water.(Fig.21)

Fig.20

※In case of PR-101

Fig.21



●The value measured by the Unit may not be correct if measurement is made while the sun shines directly on the Unit. Be sure to shield the Unit from sunshine with something or turn your back to the sun at measurement if such as the case.

8. Explanation of error messages

Palette Series alarm erroneous or incomplete operation by error messages. The followings are kinds of error messages.

"AAA" Zero setting(Standardization) error (Fig.22)

- Water(Standard Liquid) is not dropped on the prism surface and Zero setting(standardization) is made in a state of the prism surface being exposed to the air.
- Zero setting is made with a sample.
- Standardization is made with a sample and water.

"LLL"Sampling error (Fig.23)

- No sample exists on the prism surface or measurement is made in an incomplete condition.

"LLL" Range over error

- A liquid of low concentration exceeding the measuring range is measured.

"HHH" Range over error (Fig.24)

- A Liquid of high concentration exceeding the measuring range is measured.

"Lo" Battery error (Fig.25)

- When this error message is displayed in either zero setting(standardization) or start (measurement), it indicates flickering 3 times, that the battery is used up. Replace the battery with new one.
- Immediately before the battery is used up, the instrument may perform erroneous operation, without displaying the error message "Lo". In such a case, replace the battery with new one.

"..." Temperature error (3 decimal points are displayed.) (Fig.26)

- A sample at a temperature, lower than 5°C or higher than 40°C is measured.(PR-101)
- In case of PR-201, PR-301, lower than 10°C or higher than 40°C is measured.
- In such a case, the measurement value is incorrect.

Fig.22

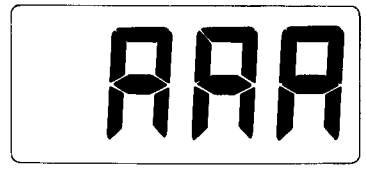


Fig.23

Fig.24

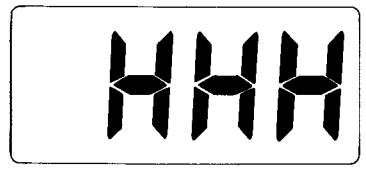


Fig.25

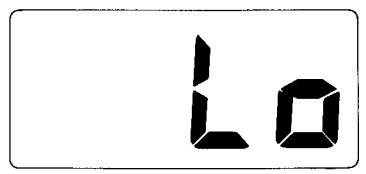
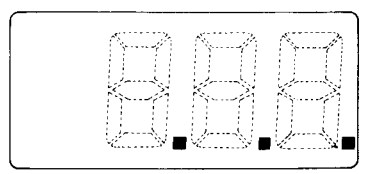


Fig.26



9. Display unit of palette series

(1) Palette Series are designed to measure concentration of liquids using the refraction of light.

- The "refractive index" is a unit which expresses the refraction of light. Individual substances have a value of refractive index of their own and the following substances have a value of refractive index at 20°C as shown below.

  Air ·····1
  Water·····1.33299
  Salad oil ·····1.47
  White plate glass ·····1.52
  Diamond ·····2.42

- The refractive index of water solutions increases gradually from 1.33299 of water as dissolved components increase.
- Scales of Palette Series are set up by unit of weight % of cane sugar dissolved in water. This is called Brix% (Brix percentage).
- In case 10g cane sugar is dissolved in 100g cane sugar solution, for examle, this solution is expressed by Brix 10%.
- There exists a fixed relation between this Brix% and the aforementioned refractive index and the relative expression is determined by ICUMSA (International Committee of Uniform Method of Sugar Analysis).
- Based on this relative expression, Palette Series converts the refractive index of sample (measured result) to Brix% and displays its value.

Table 1 Table of Refractive Indexes and Brix % 1974 ICUMSA

%	n_D^{20}	%	n_D^{20}	%	n_D^{20}	%	n_D^{20}	%	n_D^{20}
0	1.33299	20	1.36384	40	1.39986	60	1.44193	80	1.49071
1	1.33442	21	1.36551	41	1.40181	61	1.44420	81	1.49333
2	1.33586	22	1.36720	42	1.40378	62	1.44650	82	1.49597
3	1.33732	23	1.36889	43	1.40576	63	1.44881	83	1.49862
4	1.33879	24	1.37060	44	1.40776	64	1.45113	84	1.50129
5	1.34026	25	1.37233	45	1.40978	65	1.45348	85	1.50398
6	1.34175	26	1.37406	46	1.41181	66	1.45584	86	1.5067
7	1,34325	27	1.37582	47	1.41385	67	1.45822	87	1.5094
8	1.34477	28	1.37758	48	1.41592	68	1.46061	88	1.5121
9	1,34629	29	1.37936	49	1.41799	69	1.46303	89	1.5149
10	1.34782	30	1.38115	50	1.42009	70	1.46546	90	1.5177
11	1.34937	31	1.38296	51	1.42220	71	1.46790		
12	1.35093	32	1.38478	52	1.42432	72	1.47037		
13	1.35250	33	1.38661	53	1.42647	73	1.47285		
14	1.35408	34	1.38846	54	1.42863	74	1.47535		
15	1.35568	35	1.39032	55	1.43080	75	1.47787		
16	1.35729	36	1.39220	56	1.43299	76	1.48040		
17	1.35891	37	1.39409	57	1.43520	77	1.48295		
18	1.36054	38	1.39600	58	1.43743	78	1.48552		
19	1.36218	39	1.39792	59	1.43967	79	1.48811		

(2) Aqueous Solutions Other Than Sugar Solutions

- The refractive index of aqueous solutions differs depending on substances dissolved in water as individual substances have the refractive index of their own.
- Conversion is needed for aqueous solutions other than sugar solutions. Table 2 shows conversion values of main substances.

Table 2 Conversion of Concentration of Main Substances in Aqueous Solutions and Brix%

Reading of Palette Series (Brix%)	Ethyleneglycol (V/V)	Glycerine (W/W)	D.M.F. (W/W)
0.0	0.0	0.0	0.0
5.0	7.4	6.2	5.8
10.0	14.7	12.5	12.1
15.0	22.1	18.8	18.8
20.0	29.7	25.0	25.7
25.0	37.8	31.3	32.8
30.0	46.4	37.5	40.0
35.0	55.6	44.3	47.3
40.0	65.5	51.2	54.9
45.0	76.1	58.2	62.7
50.0	87.4	65.5	70.7
55.0	99.3	72.8	78.9
60.0		80.4	87.3
65.0		88.0	95.9
70.0		95.9	

(3) Solutions Mainly Containing Sugar As Food

- Fruits mainly contain sugar and they also contain acids and pectin Brix% is generally used as it is as soluble solid contens %.
- The above practice is also aplied to ketchup, jam and marmalade.
- It is well known from old days that in the case of juice (texture liquid) squeezed from plants, Brix% satisfactorily agrees with percentage of soluble solid contained in them.

(4) Water Soluble Chemical Liquids for Industry Use

- Concerning cutting oils, quenching oils, wire drawing oils and fire extinguishing chemical solutions, the conversion table is prepared by converting percentage of diluted liquid against undiluted liquid to Brix%. In this case, V/V (volume/Volume) is used in place of weight %.

Making of original conversion graph (Example)

1) Assuming that the range of concentration to measure and to control is 0 to 20%, confirm which unit is used for measurement, g/100g, g/100ml, or ml/100ml.
2) Prepare 0% (water in general), 10% and 20% dilute solutions with a balance (electronic balance), mess cylinder, pipette, etc.

Note: In the case the range of concentration to measure and to control is beyond 0 to 20%, prepare three kinds or so (including water of 0% concentration) of dilute solutions appropriately for the measuring range.

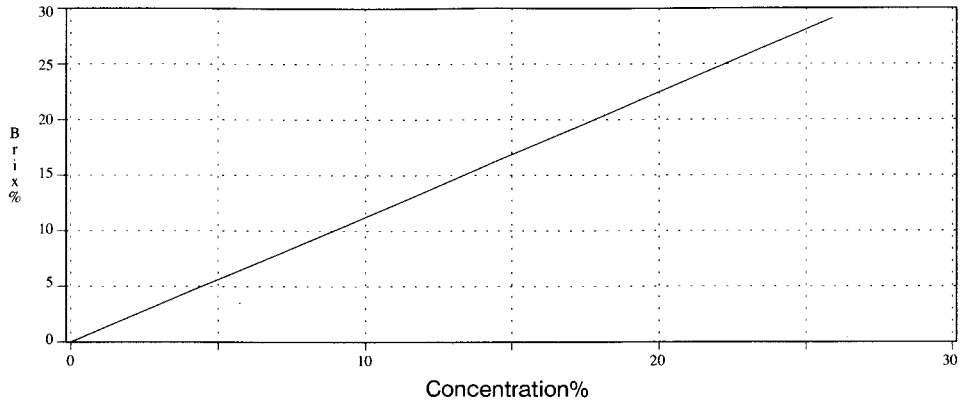
3) Measure the Brix% of the respective dilute solutions with this refractometer.
4) Assume that the values shown in the Table 3 are obtained as the respective measurement results.

Concentration(%)	Brix(%)
0.0	0.0
10.0	12.0
20.0	23.0

Table 3

g/100g

5) According to the values obtained by the measurement, a graph can be drawn as shown below.



6) The above graph can be used as a conversion table (measuring index).

(5) Automatic Temperature Compensation of Palette Series

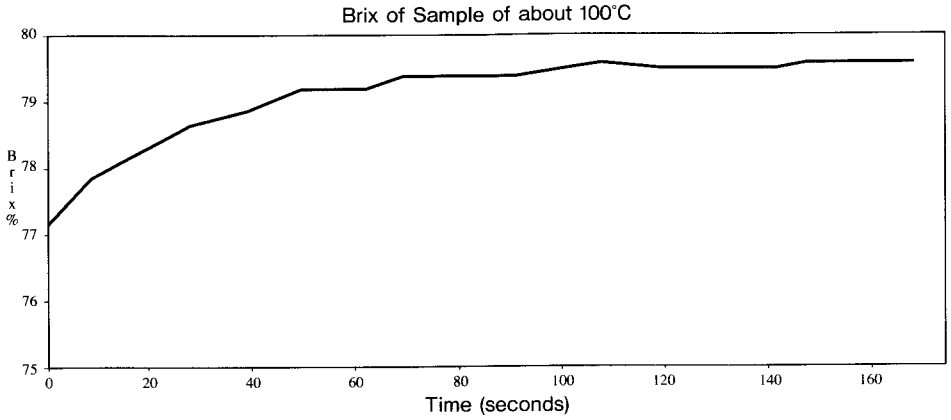
The automatic temperature compensation of Palette Series are performed based on the temperature detected on the side of the prism by a platinum resistance thermometer (Basic temperature 20°C). The temperature compensation is accurate therefore when the temperature of the sample on prism is the same as that of the prism. That is, the Palette Series are designed for use with water for zero adjustment and measurement samples which are in the same environment as that of Palette Series. The cases listed below cause a temperature difference between prism and sample, and it is not possible to achieve accurate temperature compensation:

- Measurrement of heated samples
- Samples from other environment with different temperature
- Samples taken from cooled processes
- Refrigerated samples

At measuring those samples listed above, drip a sample on the prism of Palette Series, and wait for a while to eliminate temperature difference before performing the measurement.

10. Methods of measurement for special samples

(1) Hot sample of temperature on the order of 100°C



The Unit is equipped with a platinum resistance thermometer below the Prism Surface to detect the prism temperature for temperature correction. When a hot sample of about 100°C is dripped on the Prism, it takes about 90 seconds before the Brix value displayed on the LCD stabilizes. Thus, some temperature error will be involved if a hot sample is measured without waiting for the time for stabilization.
Note that the automatic temperature correction may not work properly if the sample temperature differs much from the temperature of the Prism Surface.

Method of Measurement

To make measurement on a hot sample, drip the sample on the Prism Surface, wait for a while according to the temperature difference as given in the table below and press the START/OFF Switch when the temperature has been stablized. The temperature will stabilize sooner if the Sample Holder provided as an accessory is placed on the Prism Stage or the sample on the Prism is stirred several times with a plastic spoon.

Waiting time of hot sample

100°C	→ About 90seconds
70°C	→ About 70seconds
40°C	→ About 40seconds

(2) Pasty sample of high viscosity (in case of PR-201, PR-301)

Examples: Thick sauce, ketchup, jam, honey and syrup.

Be sure to stir a sample of high viscosity well to make it homogeneous before applying it to the Prism Surface, or measured values of such sample will be poor in reproducibility and it may be become difficult to identify a correct value.

Method of Measurement

The reduce scatters in measured values, transfer about 10 ml of a viscous sample to another container such as a cup or a beaker while stirring, and stir the sample in the container well before applying to the Prism Surface. When applied, stir the sample on the Prism Surface several times with a plastic spoon or push the sample on the Prism with the Sample Holder provided as an accessory to remove any air included between the sample and the Prism. Then press the START/OFF Switch for measurrement. Be sure to apply a viscous sample a little bit more than an ordinary sample. (Fig.27)

(3) Clotty sample (in case of PR-201, PR-301)

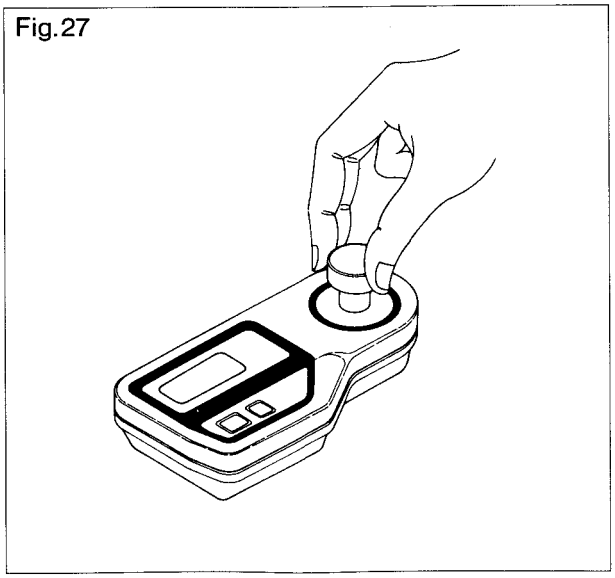
Examples: Agar cake and jelly

Clotty samples such as agar cakes and jelly wet the Prism Surface poorly, and just placing such sample on the Prism may result values poor in reproduibility.

Method of Measurement

Place a clotty sample on the Prism Surface, push the sample on the Prism with the Sample Holder provided as an accessory to let them tough closely, and press the START/OFF Switch for measurement. (Fig.27)

Fig.27



11. Preparation of standard sugar solution and testing

Make sure to inspect the refractometer periodically (monthly inspection is recommended) in order to check to see if it indicates measurement values correctly or not.
Besides the periodical inspection, check the refractometer whenever it is strongly shocked and it indicates unusual values.
For inspection of the refractometer, use the standard sugar solution besides water and the Standard liquid. The standard sugar solution can be prepared according to the following procedure.

(1) Preparation of standard sugar solution of 20% concentration

When preparing the standard sugar solution, make sure to do it in a room whose temperature is 20°C±5°C.
The standard sugar solutions of 30.0%, 40.0%, 50.0% concentration can be prepared in the same manner as mentioned below. (When preparing the 50% standard sugar solution, make sure to dissolve sugar in the water completely by stirring the mixture and shaking the vessel because sugar is not dissolvable at this rate.)

1) Necessary things

- Sucrose (highest quality): 20g or more
- Distilled water: 80g or more
- Direct indicating balance (capable of measuring 200g or more, accuracy: ±0.01g)
- Glass or plastic beaker (capacity:100ml)
- Plastic spoon

2) Preparing procedure

a. Put the beaker on the balance and adjust the balance indication to 0.00g.
b. Put 20g of the sucrose in the beaker.
c. Pour 80g of the distilled water into the beaker so that the total of the sucrose and the distilled water amounts to 100g.
d. Take the beaker out of the balance and str the mixture so as to dissolve the sucrose in the water completely.

3) Cautions on preparation

- The Brix scale(%) of the refractometer indicates measurement values at a unit of W/W (weight/weight)%.
- It is the best to prepare 100g of the standard sugar solution as a whole. (If it is less than 100g, it increases relative error in measurement.)
- The prepared standard sugar solution must be kept in a sealable vessel.
- Purchase sucrose at the rearest reagent store.

(2) Check of refractometer with standard sugar solution

1) Prepare the refractometer and set it up for measurement according to the instructions.
2) Calibrate ("zero-setting") the refractometer with distilled water that has been left at the room temperature.
Note: For calibration of the PR-301, use the Standard liquid supplied with it as an accessory.
3) Measure the Brix degree(%) of the standard sugar solution. Repeat measurement 5 times or so to obtain an average value.
4) When the refractometer reads a value that is the same as the standard sugar solution or different from it in a range of ±0.2%, the refractometer normally works. If it reads a value with difference of ±0.3% or more, examine the purity of the sucrose, concentration and preparation of the sugar solution, measurement manner, etc. once again.
5) If there is an error of ±0.3% or more observed in the measurement result after re-examination and correction of the above-mentioned conditions, immediately contact the dealer.

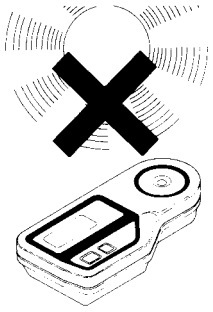
12. Storage and maitenance

- After use, wipe off a sample adhering to the prism surface and adjacent area with tissue paper wetted with water, and further, remove moisture completely with dry tissue paper.
- When storing this instrument, avoid a damp place or a place which is exposed to the direction sunrays. Dampness will cause blurs on the optical system or it will gather mold, and direct sunrays will deform the casing, disabling the instrument from performing measurement.
- Because the casing is made of plastic, it is strictly prohibited to use organic solvents (paint thinner, benzine, gasoline or the like).

⚠CAUTION

Never let the Unit fall or give shocks to the Unit

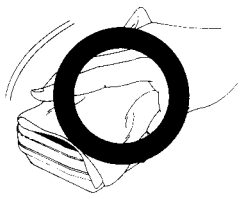
⚠CAUTION



Do not leave the Unit under direct sunshine and close to a heat source

⚠CAUTION

Never clean the Unit using a petroleum solvent



When the body gets wet, wipe off the moisture with dry cloth

13. Specifications

	PR-101	PR-201	PR-301
Measuring range	Brix0.0 to 45.0%	Brix0.0 to 60.0%	Brix45.0 to 90.0%
Minimum indication	Brix0.1%		
Measuring accuracy	Brix±0.2%		
Measuring temperature	5 to 40℃ automatic temperature compensation	10 to 40℃ automatic temperature compensation	
Ambient temperature	5 to 40 ℃	10 to 40℃	
Sample volume	0.1ml or more		
Measuring time	2 seconds		
Power supply	006 dry battery （9V）		
Dimensions-Weight	17(W)×9(D)×4(H)cm, 300g		